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TREASURY DEPARTMENT
Public Health and Marine-Hospital Service of the United States

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PUBLIC HEALTH BULLETIN No. 55
JULY, 1912

A WORD TO SHIP CAPTAINS ABOUT QUARANTINE

AN OPEN LETTER TO SHIP CAPTAINS

BY

L. E. COFER
Assistant Surgeon General
Chief, Division of Foreign and Insular Quarantine of the Bureau of the Public Health and Marine-Hospital Service

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Plague and yellow fever cause quarantine
Quarantine means expense
Ship captains, destroy your rats and mosquitoes, and not only save your owners money, but save lives

WASHINGTON
GOVERNMENT PRINTING OFFICE
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A WORD TO SHIP CAPTAINS ABOUT QUARANTINE.

AN OPEN LETTER TO SHIP CAPTAINS.

By L. E. Cofer, Assistant Surgeon General, Chief of the Division of Foreign and Insular Quarantine of the Bureau of the Public Health and Marine-Hospital Service.

There are very few people who would run the risk of plague or yellow fever infection just to save a vessel from being quarantined. No one feels sorry for the expense and trouble put upon the captain and owners of a vessel because of plague or yellow fever being on board. Everyone says " Quarantine it! " and Congress, which represents the will of the people, appropriates a sum of money every year to prevent vessels from infecting ports. Some people object to quarantine, but no one wants it abolished. Why? Because everyone has a horror of catching plague, cholera, yellow fever, smallpox, jail fever, or leprosy. When a person catches any one of these diseases even his friends consider him loathsome (and so he is), and the first thing they say is, "Take him at once to the pesthouse." People have been saying this since biblical times, they are saying it now, and they will keep on saying it. So quarantine is here to stay, and it costs money to operate it, and so far as vessels are concerned, it costs money to run against it. So what is to be done? Well, it is up to you captains of vessels. You can avoid much of the trouble and expense of quarantine for yourselves and also for your owners by following the suggestions made in this little pamphlet. In fact, the whole story is really told in this little table:

NO RATS—NO PLAGUE.
NO MOSQUITOES—NO YELLOW FEVER.
VACCINATE AND—NO SMALLPOX.
PURE FOOD, PURE WATER, AND CLEANLINESS—NO CHOLERA.
NO LICE—NO TYPHUS.

It does not cost any money to catch these diseases, and with a little trouble and expense they can be dodged, but once they infect a ship it costs both time and money to get rid of them, and, what is still more important, these diseases kill captains, crew, and passengers.

When these diseases appear in ports the expense falls rather evenly on the citizens or taxpayers, but in the case of vessels the owners are the losers. Shipowners are commencing to see this and the time is fast coming when a captain will be tried for letting his vessel become infected with quarantinable diseases and punished if the fault be his neglect to take the precautions which he could have taken to prevent infection. It may not be an everlasting disgrace for a captain to run a vessel ashore—this accident frequently happens, through no fault of the captain—but it does not help the captain in any event. People usually remember it.

It not infrequently happens that a vessel carrying valuable cargo and passengers is fumigated and dead rats are found by the hundreds.

Now, is not this a reflection upon the captain?—if not, it is a reflection upon the owners. It is evidence that they are willing to risk the cargo being damaged by the rats. They may be exposing the crew and passengers to a rat disease known as rat plague, which disease man can easily catch from the rat, and then it is known as human plague—bubonic plague, pneumonia plague, and quick-death plague. A description will be given of a rat sick with plague and then will follow a description of the same disease in a man who has contracted the disease from a rat.

When a rat becomes sick with plague his coat becomes rough and he refuses food. Ordinarily rats are afraid of people and will run away from them, but when they have plague they become restless, want help, and they come to man—at least it appears so, for rats in plague-infected vessels are frequently found dead upon the decks and in places where rats seldom go—in fact, prior to their death, rats have been reported as staggering about the decks and cabins. But they do not always do this; on the contrary, in most instances they do not. They simply die in localities on the vessel at varying distances from their nests. But that a rat, even after he has caught the plague and during this period of restless wandering, can walk from a wharf to a vessel or from a vessel to a wharf there is no doubt, and in this way may be explained the old saying "where ships go, the plague goes."

After a rat becomes sick with plague he dies in from 1 to 3 days, falling upon his side and having fits just before death. As soon as his body begins to get cool the rat fleas begin to leave and seek another warm body—either another rat or a man. The largest vessel is, after all, a small inclosure and everything and every person is at close quarters, and it is small wonder that after the rat has died away from his nesting place, usually above decks, his fleas very quickly find some person to fasten on to. As a matter of fact, they do, and the person in turn gets the plague. If the body of the rat lies in some out-of-the-way place and is not soon discovered and burned up, flies, roaches, and various insects may feed for awhile upon his body and then crawl onto the ship's food, whether it be in the ship's galley, pantries, or on the dining table. It may be depended upon that if there is a plague rat in a vessel he will soon give the disease to a few other rats, who in turn will give it either to the passengers and crew or else by escaping from the vessel at the next port give it to the rats in that port, who in turn will give it to the inhabitants.

Now as to what happens when a person catches plague from a rat.

A man has plague in three ways, first, with swellings under his arms and in his groins, bubonic plague. Second, with the fatal lung disease, known as lung fever or pneumonia plague, and, third, the quick black death, or what doctors call septicæmic plague. In this last form the patient is poisoned with plague so rapidly that he dies before the swellings or the " buboes " in his groins appear. After a person catches plague a certain length of time must pass before the person is actually taken sick. This is known as the period of incubation. It is usually seven days. This is the reason persons who have been exposed to plague are quarantined for seven days.

Occasionally when a person has contracted plague he can feel it coming on—he is " tired out," chilly, giddy, has no appetite, and his legs ache. Usually it does not give such signals, but starts in with high fever, headache, leg ache, dizziness, and weakness, and a feeling of wanting to drop down even in the street and go to sleep. There is a haggard look about the face; eyes bloodshot, sunken, and staring, and the face has a look of horror and dread or fear. If the patient can walk at all he staggers like a drunken man. The patient also gets " out of his head "—picks at bed clothes. Inside of 24 hours the groin swellings appear or else the swellings appear under the arms—in the arm pits. The swellings or buboes are in size from that of a walnut to a goose egg and they are boggy and painful. The patient will pull away at the very slightest touch of the hand.

These swellings or buboes continue to enlarge and soften and after a few days, if they are not opened, they will burst and foul-smelling pus will pour out.

Hemorrhages (oozing of blood) frequently occur under the skin in various portions of the body. In this way dark purplish spots are seen which caused the disease bubonic plague to be called the " black death."

Death may occur at any time, although it usually occurs between the third and fifth day.

So much for the bubonic form of plague. The next is the pneumonia form, because it is apt to be mistaken for an ordinary lung disease—pneumonia. This form of plague is dangerous and deadly. It is dangerous because there are millions of little plague bacilli scattered about in the patient's expectoration, and whenever he coughs he sprays the disease to those near his bedside, unless they use extreme care. This plague pneumonia begins with a chill, vomiting, terrible headache, weakness, and high fever. The patient can scarcely get his breath and he coughs violently, bringing up a lot of watery, blood-tinged matter. All of this gets steadily worse and he " gets out of his head " and usually dies on the fourth or fifth day.

There is very little to say about the third variety of plague, the quick black death or the septicæmic plague, because when a person catches it he is soon overcome with weakness and lies down almost anywhere, and if there is no one to take him to a hospital he dies where he drops. For this reason one hears that in certain places where there is plague "people are dying all over the streets." As stated above, in this form of plague the patient usually dies before the swellings or buboes form; in fact, the patient is usually so collapsed from the first that he does not even have a fever.

Now enough has been said about plague as a disease. Most important is it to discuss the means of preventing it from infecting vessels.

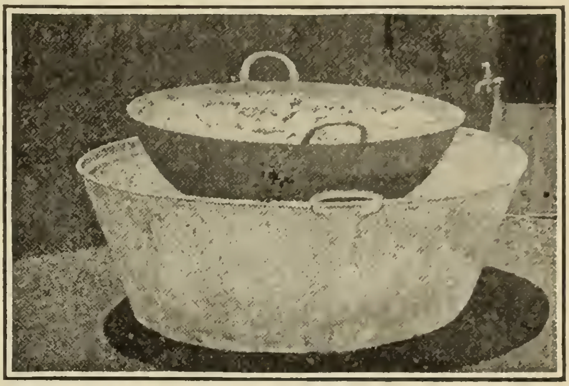
In order to do this all rats on vessels must be destroyed and measures must be taken to prevent new rats from entering vessels.

Before describing the different ways of killing the rat let us consider what kind of animal the rat really is. In the first place, both Mr. and Mrs. Rat are good travelers. They can live on next to nothing and can go without water for a long time if they can get even a little food. For example, a rat can live a month on dry grain in a grain-carrying vessel.

The brown rat, the kind ordinarily found upon ships, breeds from three to five times a year, each time bringing forth from 6 to 19 young rats. The number of rats which Mr. and Mrs. Rat can produce in a year may be realized from a known case where 2 female rats, kept in a cage, within 13 months gave birth to 26 litters of young, numbering 180 in all. One of them produced young regularly every 25 days. It is plain from the above that once rats board a vessel they will increase rapidly through breeding and inbreeding alone, not to mention the number of stray rats from wharves which will enter the vessel either concealed in parcels of freight or else by walking up the ropes or gangplanks.

Rats besides carrying plague do other damage; they damage property and freight. One authority estimates that there are as many rats as there are people, and that each rat causes each day a loss by ruining freight and property of at least half a cent. It has been estimated that the rat costs Great Britain and Ireland $73,000,000 a year. An investigation made by Asst. Surg. Gen. Kerr as to losses by rats in the cities of Baltimore and Washington showed that the annual loss in the two cities was about $700.000 and $400,000, respectively.

The yearly loss from damage by rats to cargoes in the holds of vessels and in warehouses is always considerable where no rat-killing work is being carried out or else where nothing is done to keep rats from coming aboard. Rat killing in vessels should not be considered an easy task, in view of the many compartments and openings which are the natural result of the peculiar construction and arrangement of vessels. These compartments and openings afford comfortable places for rats to build their nests in. On the other hand, ship captains are familiar with the construction of their vessels and by going to a little trouble can "build out" against the rats and force them to live in places in which they can be killed either by fumigation or by poison.



Antirat measures to be observed by ship captains:

(*a*) Destruction of rats on vessels.

(*b*) Prevention of rats boarding vessels.

To effect the destruction of rats on vessels the latter should be fumigated three or four times a year by sulphur burned in pots.

Almost any kind or size of iron pot will answer the purpose. The ordinary sugar pan 2½ feet in diameter is useful in disinfecting the hold of a vessel or a large compartment, the number of pans to be determined by the number of thousand cubic feet of area to be fumigated. Not more than 30 pounds of sulphur should be placed in each pot. For the fumigation of staterooms and the like the small iron cooking vessels are suitable. Each pot should always be placed in a tub of water, as shown in the illustration.

The tubs should be made of wood or compressed paper, as tubs made of galvanized iron or composition metal go to pieces rapidly through rust or breaks in the seams. The pots should never be placed on the floor of a compartment or bottom of the hold of a vessel. In compartments or storerooms they should be placed upon tables or chairs, and in the holds of vessels either on the "tween" decks, upon piles of ballast, or upon boxes. The sulphur should always be ground or mashed into a powder before being placed in the pots, and should be piled around the sides of the pot with a central depression or crater. Alcohol should always be used for lighting sulphur, although a hot coal will answer the purpose.

One pound of sulphur burned in a space containing 1,000 cubic feet will produce 1 per cent of the gas. Five pounds of sulphur burned in a space containing 1,000 cubic feet will produce 5 per cent of the gas.

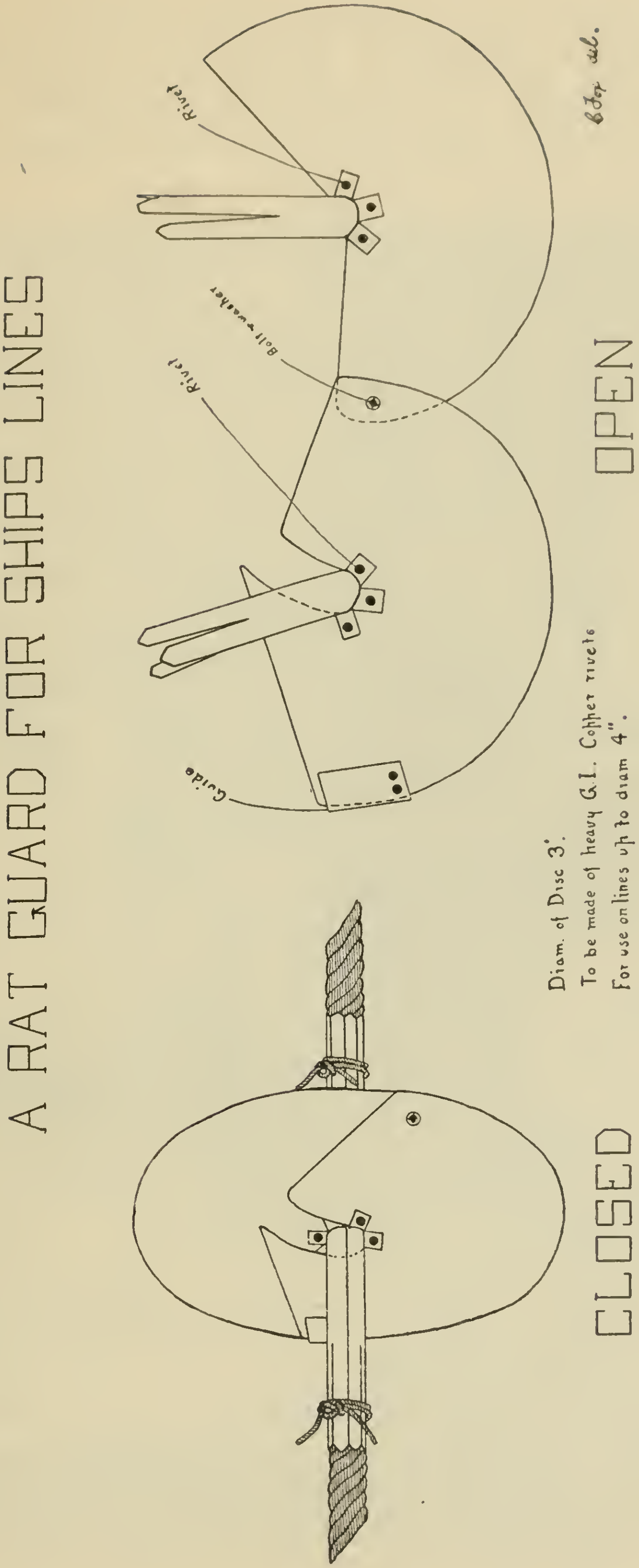
On empty vessels burn 2 pounds of sulphur for every 1,000 cubic feet of space and let the gas stand for six hours.

In computing the capacity of the hold of a vessel for the purpose of determining the number of thousand cubic feet of space therein, and therefore the number of pounds of sulphur which will be required to produce a 2 per cent volume of the gas, the net tonnage of the vessel shows in a general way the cubic capacity of her cargo-carrying space. Ten net tons will represent 1,000 cubic feet of space; therefore, for every 10 net tons 2 pounds of sulphur must be used to get the average 2 per cent volume strength of sulphur gas. The capacity of the living apartments, storerooms, and the like had best be figured on separately.

In fumigating with sulphur gas all spaces must be made airtight. In fumigating the holds of vessels the hatches should be covered over with their regular waterproof tarpaulins and tightly battened down, leaving a small vent for the escape of the sulphur. All air slits, scuttles, and chain ports should be closed. The doors should be sealed by means of strips of paper pasted over the cracks left between the frame and the door.

If the vessel has cargo the killing of rats should be carried out under the direction of the nearest quarantine officer. After the fumigation is over the rats should be gathered (with the hands protected by heavy gloves) and burned in the ship's furnace or donkey boiler firebox, not in the galley.

Now, the important thing is to keep the vessel from becoming reinfested with rats. This is effected by (1) the use of rat funnels or guards on all lines while the vessel is in port, (2) by keeping a watch for rats attempting to walk up the gangplank, (3) by keeping a sharp lookout for rats being concealed in loosely crated freight, (4) by keeping the ship's food and stores carefully protected from rats, (5) by distributing rat poison (phosphorus or arsenic paste) in the vessel, (6) by keeping ship's cats (they should not be overfed, else they will not try to catch rats), and, finally, by keeping rat traps constantly set. The following illustration shows what a rat-guard looks like:



A RAT GUARD FOR SHIPS LINES

Diam. of Disc 3'.
To be made of heavy G.I. Copper rivets
For use on lines up to diam 4".

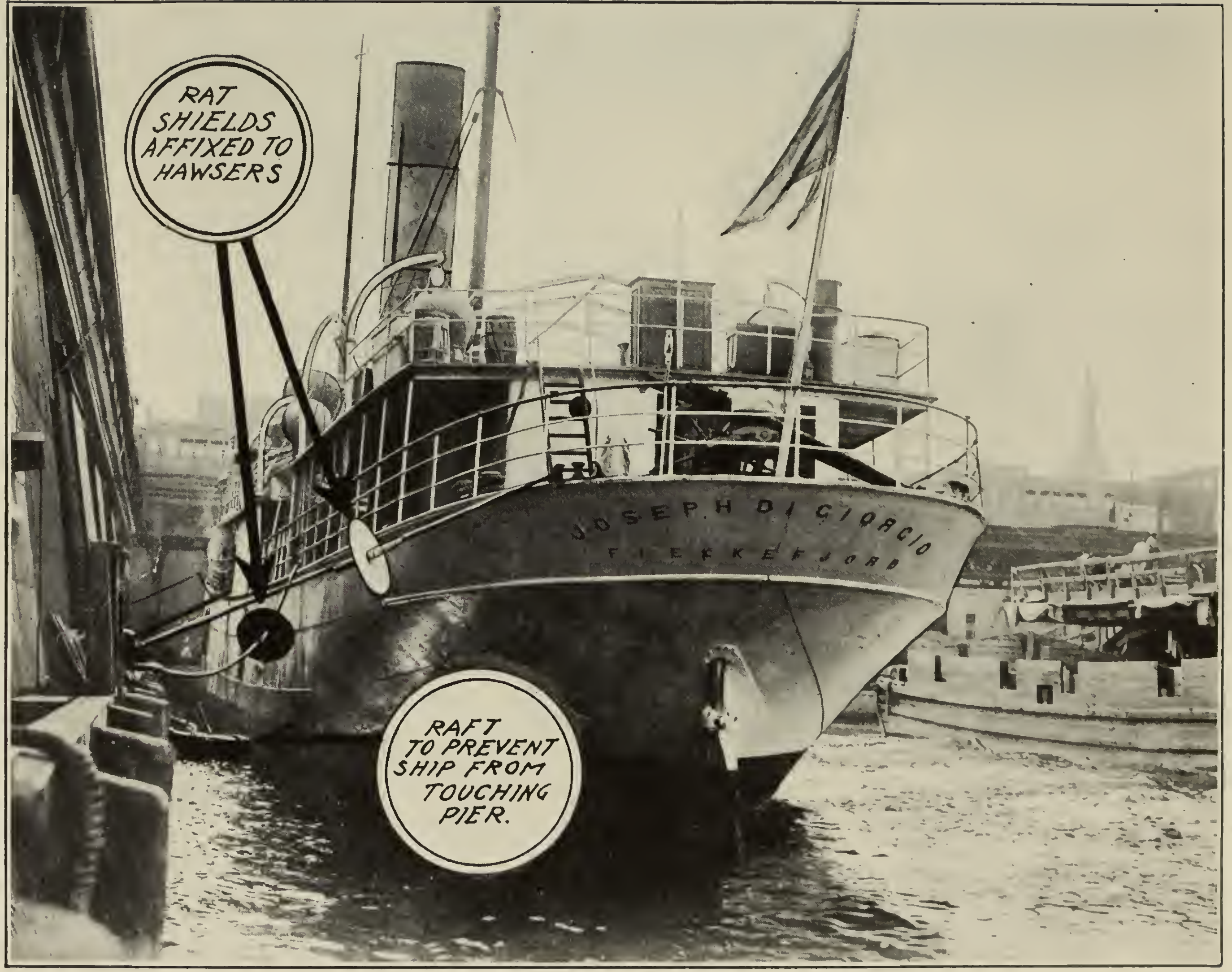
The special points of this rat guard are these: A single shield in two parts with arms (funnels) from both sides. It is hinged by bolting at the outside of the shield. There is a guide permitting a perfect fit of the two parts of the disk when closed. It can be used on many different sizes of rope and when placed on the line fits closely by tying on both sides. Rivets are used throughout, thus increasing the strength. The outside half of the arms is cut lengthwise into three strips so that they may be bent to come into immediate contact with the rope when tied.

The details for making the rat guard are as follows: Flat sheet galvanized iron is used for all parts of the guard; 20 to 24 gauge answers best, for that weight of iron is strong enough and does not make the guard too heavy. The shield should not be less than 3 feet in diameter. The funnel tubes should be 18 inches long on each side of the shield. The central opening can be made to fit any size of rope. One made for a 3-inch diameter rope will serve for all smaller sizes. When made or used for encircling a number of lines at the same time the shield should be 4 feet in diameter and the funnel tube enlarged and supported by five flanges and five rivets instead of three. The guide piece, which is the one important feature of this rat guard, is riveted on one side only and then bent around the circumference. The rivets which fasten the funnel tubes go through the tube flanges on each side of the shield. One bolt, two washers, and five rivets are needed for each guard. When badly damaged by use or carelessness a block of wood and a hammer are all that is required to restore the guard to its former usefulness.

When a ship is in port, especially in a plague-infected port, all gangways should be hoisted at night. The captain of a vessel should insist upon the repeated distribution of rat poison in the warehouses from which his cargo is to be taken. He should in some manner be able to inspect the freight intended for his vessel to guard against rats being taken aboard with loosely crated freight. By loosely crated freight is meant such articles as crockery or china packed in straw or excelsior or furniture or matting wrapped in gunny and loosely crated, also peanuts, rice, sugar, wheat, corn, oats, etc., shipped in bags.

Wherever ships go—plague will go. No rats—no plague.

The next disease to take up is yellow fever, or yellow jack. A person catches yellow fever from a mosquito bite. Not from any mosquito which happens along, but from a special kind, a striped black and white fellow called the stegomyia calopus. In order that this mosquito may carry yellow jack he must bite a person who is suffering from yellow fever during the first three days of his illness, but after the mosquito bites the sick man, 12 days must go by before this mosquito can give the disease to another person by biting him, but after 12 days and just so long as the mosquito lives, and he may live 154 days, he can spread yellow jack by biting people. The yellow fever mosquito is found nearly everywhere, but especially between 38° north and 38° south latitude. It breeds and lives in


RAT SHIELDS AFFIXED TO HAWSERS
RAFT TO PREVENT SHIP FROM TOUCHING PIER.
JOSEPH DI GIORGIO
FLEKKEFJORD

VESSEL PROPERLY FENDED FROM WHARF WITH RAT GUARDS EFFECTIVELY FASTENED TO LINES.

(Courtesy of Philadelphia Press.)

houses, on vessels, in water pools, cuspidors, gutters, or in very damp places; for instance, in the keelsons of a vessel.

The eggs are laid on the surface of the water, or on the sides of the containers (tin cans, or other similar things) just above the water line. From the time the eggs are laid until the mosquitoes are hatched out is only about 9 days, and immediately after the birth of the female she is impregnated and 3 or 4 days after this she is ready to lay eggs. As stated above, after the mosquito is hatched out it may live as long as 154 days. The male yellow-fever mosquito does not bite but lives on vegetable and fruit juices. The female, however, must have a feed of blood before laying her eggs. If the female is disturbed while making her blood meal, for example, by being brushed off by the hand, she will fly away only to return to finish her meal. In this way, one female mosquito infected with yellow fever may try several persons in turn in order to finish her blood meal, and thereby may infect several members of a ship's company and produce several cases of yellow fever.

Yellow fever is not carried by such things as clothes, and therefore no attention need be paid to such articles save to rid them of mosquitoes. The yellow-fever mosquito will bite at any time during the 24 hours. The idea formerly prevailed that these mosquitoes did not bite in the daytime, and therefore shore liberty was frequently allowed to crews in yellow-fever ports during the day. This, however, is now known to be a dangerous practice for captains of vessels.

Yellow fever is also called yellow jack, sailor's fever, and black vomit.

A person bitten by a yellow-fever mosquito sickens in from 24 hours to 6 days after the bite, and the disease may be divided into three stages. In the first stage, the patient has at first a headache, no appetite, feels exhausted, and perhaps has a chill. This is followed by a high fever with pains in the head, limbs, and back. The attack usually begins at night or in the early morning hours. The patient's pulse is rapid, his face is flushed, his eyes are bright, and there is a desire to vomit. The patient then becomes very restless, is anxious, tosses about in his bunk, and is very weak. There is a peculiar odor about him also. This first stage lasts from about 36 hours to 3 or 4 days, and during the latter part of this time his body becomes slightly yellow. The patient may be "out of his head."

The next stage, the second stage, is the one in which the fever goes down and all the bad symptoms above described may suddenly stop and the patient begin to get well, but more frequently in from a few hours to 4 days the patient runs into what is known as the third stage, in which all the bad symptoms described in the first stage come back, but the patient is very much sicker, and his body becomes yellow, even sometimes becomes of a deep mahogany color, and the vomiting of black material commences. His pulse is then very weak, the surface of the body is cold, the patient breathes in jerks, and while his mind remains clear, he may die in this stage from simply being "worn out."

Should a physician be called in the first stage of the disease he will note that as the temperature rises the pulse beats faster at first, but later beats very much slower. He will also notice that the urine is very small in amount, very highly colored, and contains albumen.

When the captain of a vessel finds anyone on board suffering from a disease answering the description above given, particularly if said disease occurs in connection with any locality known to be yellow-fever infected, or else thought to be so, the action which the captain should take immediately is as follows:

First. Protect the patient from mosquitoes by the use of a mosquito net, or in the absence of one of these, by carefully screening with fine netting the stateroom or cabin in which he is being treated. This is because in the first three days of yellow fever, mosquitoes become infected by biting patients suffering from the disease.

Second. Muster all hands and kill every mosquito on the ship. Burn 2½ pounds sulphur, by pot-and-pan method already described, for each 1,000 cubic feet of space, and let the gas remain for two hours. If there is no sulphur on board and it can not be bought, burn ordinary insect powder, 4 pounds to every 1,000 cubic feet of space, for two hours, but when either insect powder or sulphur are used the mosquitoes should be swept up and destroyed as soon as possible, otherwise many of them may come to life. Before attempting to kill mosquitoes all closet doors and drawers should be opened, and all clothes taken out into the sun or light.

After fumigating the vessel in the manner above described, sprinkle a small quantity of kerosene oil on the surface of all water containers which are not kept closed. It is particularly necessary that the water in the bilges of the vessel and also the water in the bottom of the lifeboats should be treated with kerosene oil, and this oiling process must be frequently repeated for the reason that as soon as the vessel enters port a new crop of mosquitoes will come aboard. It is necessary that a continuous warfare be waged against these insects. No mosquitoes—no yellow fever.

Smallpox.—Every captain knows what this disease looks like, so there is no need to waste time describing it. Every captain knows that his ship will be quarantined if he has a case of smallpox on board. But not every captain knows that by having his crew vaccinated and by refusing to ship new crew men until they are vaccinated he can protect himself against censure from his owners for exposing his vessel to quarantine from smallpox. A captain can get his crew vaccinated in any American port free of charge by applying to the marine-hospital surgeon in the customhouse. In a foreign port the United States consul can arrange for the crew to be vaccinated at a very small cost, and what does a few dollars amount to when spent to protect a ship's crew from smallpox, and the shipowners from the expense of quarantine.

Ship fever or jail fever.—Think of people having fevers known as "ship fever" and "jail fever," and yet this disease occurs on ships and is called typhus fever, and, worse yet, it is carried by lice. Now, a great many people in this world have at one time or another gotten lousy—doctors frequently get lousy by examining or operating upon lousy patients. There is just one thing to say, and that is that as soon as a person finds he has lice on him he should drop everything and proceed to get rid of them. Captains of vessels should pass the word regularly as to whether any of the crew have lice on them. If this be the case the man should apply kerosene oil to the parts of his body infected and should follow this up by frequent washings with soap until all the nits on the body hairs have been removed. Then everything which can be burned should be burned, and whatever is too good to burn should be boiled. The bunks should be swabbed well with kerosene oil, and, if possible, the crews' quarters should be scrubbed down and painted.

When a sailor catches typhus or ship fever he is taken sick in from a few hours to two weeks after the lice bite him. He gets sick suddenly, has a chill, and pains all over him, with a high fever, weakness, dizziness, and quivering all over. After the fifth day and up to the seventh day a nasty-looking measly skin disease appears. The skin looks splotchy, and the patient gives off a foul odor. The sickness is very catching, lasts two weeks, and kills many people. It has been known to kill nearly half those having the disease. No lice—no typhus.

Cholera.—Every ship captain has heard of cholera, many ship captains have seen people die of it, but no ship captain will willingly let the disease get amongst his passengers and crew if he can help it, but many ship captains may not know just how they can help it or just how they can not.

Pure food, pure water, and cleanliness—no cholera; which means that in a cholera-infected port a captain should keep his crew on board, allow them to eat only food that is served steaming hot, allow them to drink only water that has been boiled, and not to allow any crew man to sit at table without washing his hands. In addition to this a strict guard should be kept against purchasing articles of food or bottled water from bum boats. A ship captain never knows when he is trading out of a cholera-infected port whether or not he has a "cholera carrier" on board.

A cholera carrier is a person who, although he has the cholera, is not sick himself. but he can give cholera to other persons, and the other persons if they catch the cholera from the "cholera carrier" may die of it in a few days. For this reason the ship latrines must be kept clean, all flies and insects must be killed, the food supplies must be kept carefully screened against flies, and every one, especially the cooks and waiters, must be made to wash their hands frequently. Captains of vessels trading in cholera ports should cut out the following warning and paste it up in every room or compartment in the vessel.

WARNING—HOW TO GUARD AGAINST CHOLERA.

Cholera CAN BE INTRODUCED INTO THE SYSTEM ONLY THROUGH THE MOUTH. It is caused by microbes too minute to be seen except with a microscope. These microbes are readily killed by heat, and the disease may therefore be successfully fought by the proper use of fire and hot water, which are at the disposal of everyone.

To avoid cholera and prevent its spread, observe the following precautions:

1. Boil all drinking water and place it while hot in covered vessels. Do not dip up the water when needed, but POUR it into drinking cups; otherwise cholera germs may get into the water from the hands.

2. Do not touch drinking water or food with the hands unless they have just been washed in water that has been boiled.

3. Eat only cooked food. Avoid all raw fruits and vegetables. Fruits may be made comparatively safe by dipping them a few seconds into boiling water.

4. Flies may carry cholera germs on their feet from human excreta to food; therefore to protect it from flies, cover all food immediately after it is cooked.

5. Boil all water used for diluting milk.

6. Cook all meats and fish thoroughly so as to heat the same throughout.

7. Keep kitchen and table dishes thoroughly clean and scald them before using.

8. Keep the place in which you live and everything pertaining to it clean.

9. Water closets can be made safe by flushing with fire hose and then with a 5% solution of carbolic acid. When this can not be done dejecta may be buried or thoroughly covered with earth.

10. Isolate all the sick.

11. Filth or vomit and the dejecta of the sick should be promptly cleaned up with boiling water and buried.

12. Clothes and bedding used by sick persons must be boiled.

Now, captains, ask your owners to back you up in fitting out your ship so at any time you can kill your rats, mosquitoes, and, if there are any on board, your lice.

1. Burn up all your rubbish, including old ropes and unused timber, cans, paint buckets, etc.
2. Put your doors and ports in good repair so they can be closed easily and be made tight.
3. Put your crew to work making canvas hatch and ventilator coverings.
4. Put half-inch wire mesh plugs in the spaces left between all pipes and the sides of the bulkhead openings through which the pipes pass.
5. Protect ice boxes and provision lockers from rats by using half-inch wire mesh freely, and raise the lockers from the decks, mounting them upon short legs.
6. Look after the sheathing in the vessel's hold. Do away with as much of the temporary sheathing as possible, and see that all rat holes in the permanent sheathing are covered up by patches of half-inch wire mesh.

Remember that much of the time required in fumigating a vessel is taken up not in burning the sulphur or pumping in whatever gas is to be used, but in making the holds, cabins, and other compartments of the ship air tight, so that the fumigating gas will get at the rats and mosquitoes.

Lend a hand, captain, to this quarantine business. There's money in it for your owners in the long run.

LIST OF PUBLIC HEALTH BULLETINS.

[Those marked (*) are no longer available for distribution. Those marked (†) may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C.]

The following is a list of the Public Health Bulletins that have been issued:

*1. Report on Trichinæ and Trichinosis. By W. C. W. Glazier. 1881. 212 pages. 87 il. 1 map. Paper. Senate Executive Document No. 9, Forty-sixth Congress, third session. Out of print.

*2. Report on the Etiology and Prevention of Yellow Fever. By George M. Sternberg. 1890. 271 pages. 21 pl. 20 il. Cloth. Out of print.

*3. Mortality Statistics in the United States for the year ending December 31, 1897. From Annual Report Marine-Hospital Service, 1898. 24 pages. Paper. Out of print.

4. Yellow Fever: Its Nature, Diagnosis, Treatment, and Prophylaxis and Quarantine Regulations Relating Thereto. By officers of the Marine-Hospital Service. Reprint from Annual Report Marine-Hospital Service, 1898. 176 pages. 1 il. Paper.

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†6. Report of Commission of Medical Officers Detailed by Authority of the President to Investigate the Cause of Yellow Fever. By Eugene Wasdin and H. D. Geddings. July, 1899. 98 pages. 26 charts. 2 il. Paper. Superintendent of Documents. 5 cents.

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†11. Transactions of the First Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. June, 1903. 120 pages. Cloth. Superintendent of Documents. 20 cents.

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†15. Transactions of the Third Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. May, 1905. 52 pages. Cloth. Superintendent of Documents. 30 cents.

16. How to Prevent Yellow Fever—No Mosquitoes, No Yellow Fever. By Walter Wyman. July 31, 1905. 3 pages. Circular.

†17. Transactions of the Fourth Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. May, 1906. 75 pages. Cloth. Superintendent of Documents. 35 cents.

†18. Transactions of the Fifth Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. May, 1907. 47 pages. Cloth. Superintendent of Documents. 25 cents.

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